

(No Model.)

2 Sheets—Sheet 1.

P. W. NAHL.
NAVIGABLE AIR SHIP.

No. 439,421.

Patented Oct. 28, 1890.

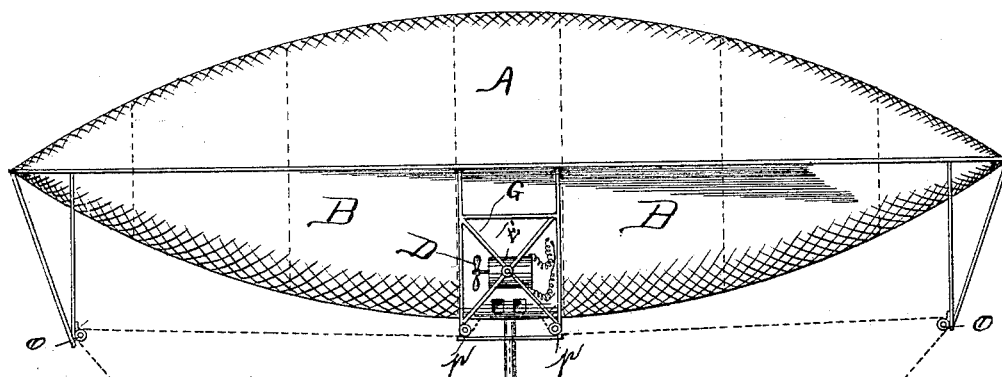


Fig. 1.

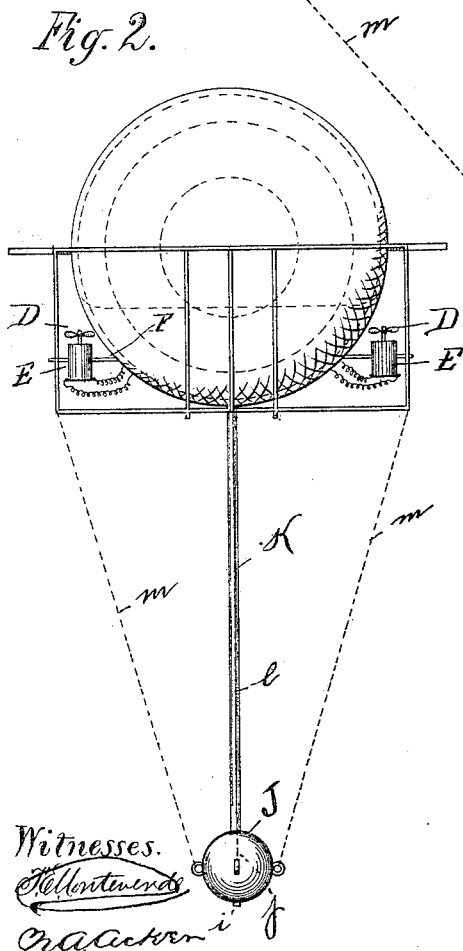


Fig. 2.

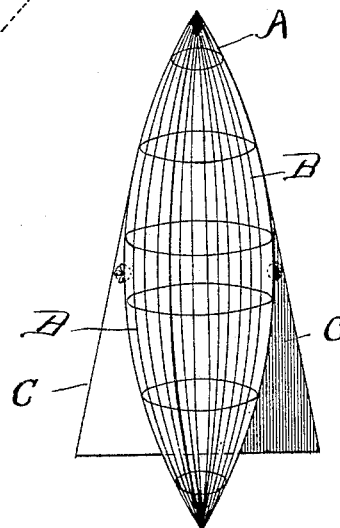


Fig. 3.

Witnesses.

W. H. Montemurro

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By *John L. Bonn*

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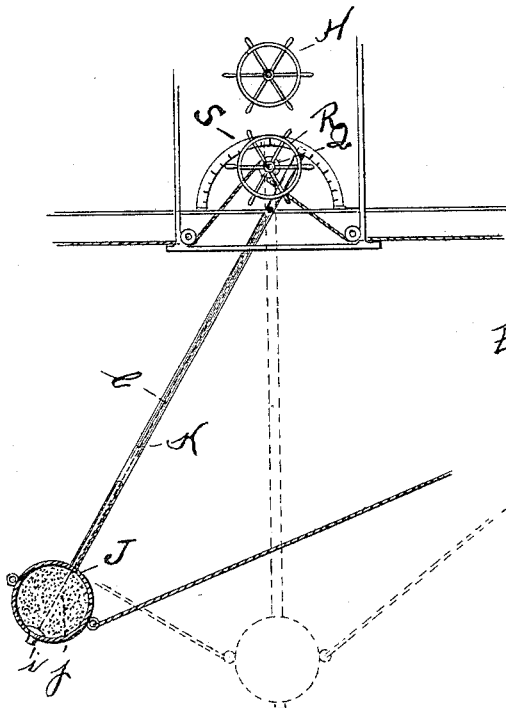


Fig. 4.

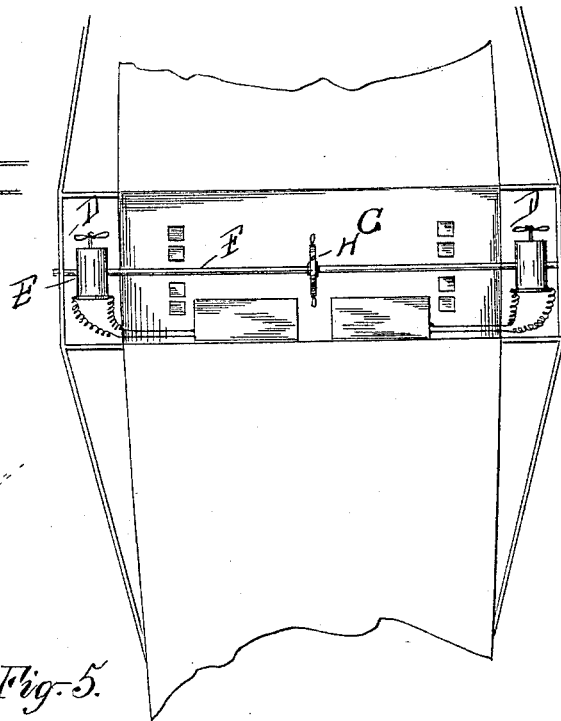


Fig. 5.

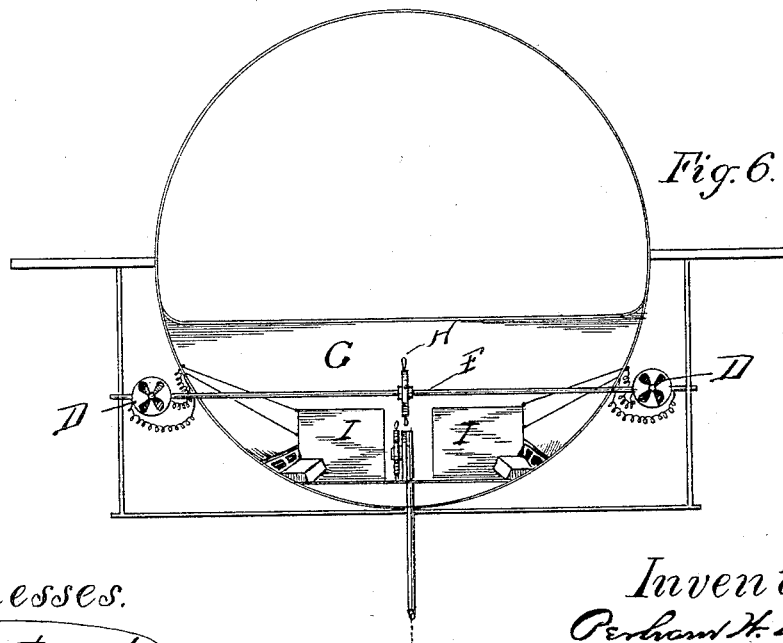


Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

PERHAM W. NAHL, OF SAN FRANCISCO, CALIFORNIA.

NAVIGABLE AIR-SHIP.

SPECIFICATION forming part of Letters Patent No. 439,421, dated October 28, 1890.

Application filed November 25, 1889. Renewed August 21, 1890. Serial No. 362,569. (No model.)

To all whom it may concern:

Be it known that I, PERHAM W. NAHL, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Navigable Air-Ships; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

The object of my invention is to provide an improved means and mechanism for propelling, guiding, and controlling the movements of that class of air-ships in which an inflated gasometer pointed at both ends is used to obtain the necessary buoyancy to cause it to rise and sustain itself in mid-air.

Referring to the accompanying drawings, forming a part of this specification, in which similar letters of reference are used to denote corresponding parts throughout the entire specification and drawings, Figure 1 is a side elevation of my improved air-ship, showing the side planes or wings, propeller, and governor. Fig. 2 is an end view of the ship; Fig. 3, a plan view. Fig. 4, Sheet 2, is a detached elevation showing the ship-governor thrown forward and indicating its vertical position in dotted lines. Fig. 5, Sheet 2, is a section of the ship, showing the propellers and propeller-shaft in full lines; and Fig. 6 is a transverse section of the air-ship, taken through the middle of Fig. 1, for the purpose of showing more fully the engine-room.

The letter A is used to represent the gasometer or air-vessel, which may be made of oiled silk or other fabric which is impervious to gas, and covered with a suitable rope-netting in the usual manner. This gasometer is pointed at both ends, and it has two or more partitions B B, which divide its interior into separate compartments, as shown more fully in Figs. 1 and 3. These partitions are also made of material which is impervious to the gas, so that in case either of the compartments should leak the others will retain the gas. At the middle of the gasometer, on its under side, I construct a chamber G in the body of the gasometer, in which the motive power and operating mechanism are placed.

Extending from the middle of the vessel on

each side are the planes or wings C, which extend back along the median line of the vessel toward the rear pointed end, as clearly shown at Fig. 3. These wings or planes are stationary, and they flare outward from their forward to their rear ends, so that their widest portion is near the rear end of the vessel. They are designed to sustain the vessel and steady it in its movements through the air. The peculiar shape of these planes render them more effective than the planes heretofore proposed for such vessels, because they form a broad surface at the rear of the vessel and leave the bow or forward end free to be guided up or down, as will more fully appear hereinafter.

The propellers D D are mounted on electric motors E E, by which they are driven. These motors are located on each side of the vessel, and are mounted on the ends of the shaft F, which passes across and through the engine room or chamber G. The ends of this shaft bear in a strong frame-work on each side of the vessel, and the propellers are mounted just inside of the frame-work, as shown at Figs. 2 and 5. A hand-wheel H on this shaft, inside the chamber G, enables the engineer to turn these propellers to any desired position, as hereinafter explained. The motors are driven by electricity contained in the storage-batteries I I inside the chamber G, through proper connections, which are plainly shown in the drawings.

For guiding the vessel, and at the same time causing it to preserve its proper position in its upward or downward flight, I have devised a very simple and effective device which I call a "governor." The same consists of the hollow cylinder or shell J, which is preferably made of metal, suspended below the air-ship by a tubular rod K, which by preference is made flexible, the upper end of which is secured on a pivot or trunnion in the chamber G. Through the lower part of the ball or shell J is an opening *i*, which is closed by a valve *j*. A rod *l* leads from valve *j* through the tubular rod K to the interior of chamber G, so that the valve can be opened or closed by the engineer in the chamber. The ball or shell J, I fill with sand or other heavy granular substance which will flow out through the opening *i* when the valve *j* is

raised. As before stated, this ball hangs at a considerable distance below the air-ship, so that the center of gravity is below the vessel. Cords *m* lead from the ball in opposite directions toward the ends of the ship, and pass over pulleys *O* on a frame-work at each end, and thence lead to the engine room or chamber *G*, where they pass under pulleys *p*, and thence around a winding-drum or shaft *Q*, as shown more fully in Fig. 4. This winding-drum is turned by means of an ordinary hand or steering wheel *R*, so as to wind up one of the ropes or cords while the other is unwound. By this means the engineer can move the ball forward or aft as occasion requires, and thus shift the center of gravity to any desired position underneath the ship. A graduated quadrant *S* enables him to adjust the weight or ball to any desired point and determine its position without leaving his place.

In operation the gasometer-chambers are filled with hydrogen or other gas to render the vessel buoyant. The proper electric connections being made with the motors *E*, the propellers are set in operation, and by means of hand-wheel *H* they are turned so as to carry the propellers to the position necessary to drive the vessel in the desired direction. By adjusting the position of the ball-weight *J* the vessel can be guided up or down, and by opening valve *j* the sand or other mobile weight in the ball can be discharged or partly discharged to relieve the vessel of weight and permit it to ascend more freely. In alighting upon the ground the ball weight, by reason of its pivotal connection to the vessel-bottom, will, upon coming in contact therewith, be gradually thrown forward or backward until it is brought on a level with the bottom of the vessel.

I am aware that many minor changes may be made in the construction herein shown and described without necessitating a departure from the nature and scope of my invention.

Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an air-ship, the combination, with the body thereof, of the hollow shell or ball *J*, suspended below said vessel and connected thereto by means of the tubular rod *K*, said ball having an opening *i* formed therein, and the valve *j*, arranged to be opened or closed by means of the rod *l* working within the hollow rod *K*, substantially as set forth.

2. In an air-ship, the combination, with the body thereof, of the weight or ball *J*, suspended below and connected to the vessel by means of the swinging rod *K*, and of the mechanism, substantially as described, for throwing the ball or weight forward or backward so as to regulate the direction of the vessel, substantially as set forth.

3. In an air-ship, the combination, with a vessel provided with a central engine room or chamber, of a frame-work located upon opposite sides of said vessel, a tubular rod having its upper end pivoted in the engine room or chamber and its lower end provided with a hollow shell, the latter provided with a suitable vent or opening, means for closing and opening said vent, a transverse shaft or winding-drum passing through the engine room or chamber and provided with a suitable hand-wheel, and cords extending from diametrically-opposite points of the shell and extending upwardly over pulleys in the frame-work at the ends of the vessel, and thence beneath pulleys in the central portion of the frame-work, from which point they extend up into the chamber and connect with the winding-drum in such manner that when one cord is being wound up the other cord will be unwound, substantially as set forth.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

PERHAM W. NAHL.

In presence of—

N. A. ACKER,

F. N. BIGELOW.